PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-312623

(43)Date of publication of application : 09.11.1999

(51)Int.Cl. H01G 4/30
H01G 4/12

(21)Application number : 10-118235 (71)Applicant : KYOCERA CORP

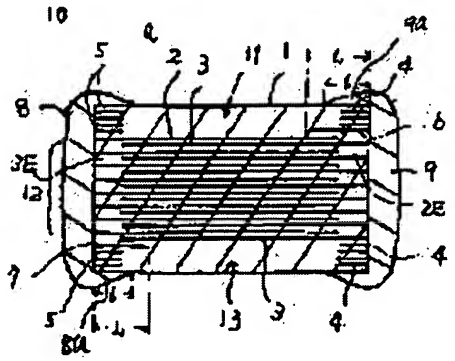
(22)Date of filing : 28.04.1998 (72)Inventor : UCHI KAZUTAKA

(54) LAMINATED CERAMIC CAPACITOR

(57)Abstract:

PROBLEM TO BE SOLVED: To reduce dispersion in the capacity of the capacitor as a whole and to prevent a dielectric ceramic layer from being peeled off.

SOLUTION: A laminated ceramic capacitor 1 is constituted of forming an external terminal electrode 8 connected to a 1st internal electrode 2 of a capacity forming part 12 on one end part of a capacitor body 1 consisting of an upper side margin part 11, the capacity forming part 12 and a lower side margin part 13 and forming an external terminal electrode 9, connected to a 2nd inner electrode 3 of the capacity forming part 12 to the other end of the body 1. Thickness absorbing layers 4, 5 extended from the end parts respectively which form the 1st and 2nd external terminal electroders 8, 9 to a center part are respectively arranged on the upper and lower margin parts 11, 13 and at least one of the layers 4, 5 be formed as a conductive extended thickness absorbing layer 6 or 7 which extends to the center part side of the body 1, more than the extended length of the electrodes 8, 9 connected to the layers 4, 5 to the outer surface of the body 1.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than

the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-312623

(43)Date of publication of application : 09.11.1999

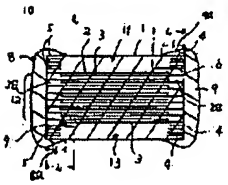
(51)Int.Cl. H01G 4/30

H01G 4/12

(21)Application number : 10-118235 (71)Applicant : KYOCERA CORP

(22)Date of filing : 28.04.1998 (72)Inventor : UCHI KAZUTAKA

(54) LAMINATED CERAMIC CAPACITOR



(57)Abstract:

PROBLEM TO BE SOLVED: To reduce dispersion in the capacity of the capacitor as a whole and to prevent a dielectric ceramic layer from being peeled off.

SOLUTION: A laminated ceramic capacitor 1 is constituted of forming an external terminal electrode 8 connected to a 1st internal electrode 2 of a capacity forming part 12 on one end part of a capacitor body 1 consisting of an upper side margin part 11, the capacity forming part 12 and a lower side margin part 13 and forming

an external terminal electrode 9, connected to a 2nd inner electrode 3 of the capacity forming part 12 to the other end of the body 1. Thickness absorbing layers 4, 5 extended from the end parts respectively which form the 1st and 2nd external terminal electroders 8, 9 to a center part are respectively arranged on the upper and lower margin parts 11, 13 and at least one of the layers 4, 5 be formed as a conductive extended thickness absorbing layer 6 or 7 which extends to the center part side of the body 1, more than the extended length of the electrodes 8, 9 connected to the layers 4, 5 to the outer surface of the body 1.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

CLAIMS

[Claim(s)]

[Claim 1] The capacity formation section which has, on the other hand, arranged by turns the internal electrode and the another side internal electrode which extends in the center section from an another side edge which extends in the center section from an edge on the other hand between the layers of two or more rectangle-like dielectric porcelain layers, The body of a capacitor which arranges the margin section which has a thickness buffer coat between the layers of two or more rectangle-like dielectric porcelain layers of this capacity formation section up and down, and changes, It is the stacked type ceramic condenser which consists of the external terminal electrode formed in the vertical side made to extend from the end face and this end face of this body of a capacitor so that it might connect with an internal electrode. One of the thickness buffer coats of said margin section as a conductive layer The stacked type ceramic condenser characterized by making it extend in the direction of a center section from the edge of the body of a capacitor so that it may connect with the external terminal electrode which is not connected with the internal electrode located in the maximum upper and lower sides of this capacity formation section and may become longer than the die length of the extension section of the capacitor vertical side of this external terminal electrode .

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a stacked type ceramic condenser.

[0002]

[Description of the Prior Art] The capacity formation section which arranges the 1st internal electrode and the 2nd internal electrode by turns, and changes conventionally among two or more rectangle-like dielectric porcelain layers by which the laminating was carried out, On the other hand, the body of a capacitor which consists of the margin section which consists of two or more rectangle-like dielectric porcelain layers arranged to both the principal plane side of this capacity formation section at the edge The stacked type ceramic condenser in which the 2nd external terminal electrode which connects the 1st external terminal electrode linked to said 1st internal electrode with said 2nd internal electrode at the another side edge was formed is known. Between the dielectric porcelain layers which constitute the margin section, the stacked type ceramic condenser which has arranged the thickness buffer coat prolonged in the center section was proposed from the edge in which said external terminal electrode

was formed (JP,5-234805,A).

[0003] Drawing 1 is the appearance perspective view of a common laminating ceramic condenser, and drawing 5 is the sectional view of a stacked type ceramic condenser. Drawing 6 is the decomposition perspective view of the body of a capacitor of a stacked type ceramic condenser.

[0004] The 1st external terminal electrode 8 and the ****** terminal electrode 9 were formed in the edge including the both-ends side of the body 1 of a capacitor with which the stacked type ceramic condenser carried out the laminating of two or more dielectric porcelain layers, internal electrodes, etc.

[0005] This body 1 of a capacitor consists of the top margin section 11, the capacity formation section 12, and the bottom margin section 13, and the 1st internal electrode 2 and the 2nd internal electrode 3 are arranged by turns in the dielectric porcelain layers 11n and 12a which constitute the capacity formation section 12, and 12a...12n. For example, rectangle-like dielectric porcelain layers 12a and 12c ... The rectangle-like 1st internal electrode 2 is arranged upwards, and they are the rectangle-like dielectric porcelain layers 12b and 12d... The 2nd internal electrode 3 is arranged upwards.

[0006] Here, the 1st internal electrode 2 has extended to one **** (drawing left-hand side) of the longitudinal direction of dielectric porcelain layer 12a, and the 2nd internal electrode 3 has extended to **** of another side (drawing right-hand side) of the longitudinal direction of dielectric porcelain layer 12b. And on dielectric porcelain layer 12a, the margin section (and margin section 2E [The 1st]) is formed at the point side (another side edge side) of the 1st internal electrode 2. Similarly, on dielectric porcelain layer 12b, the margin section (and margin section 3E [The 2nd]) is formed at the point side (on the other hand edge side) of the 2nd internal electrode 3.

[0007] Moreover, the thickness buffer coats 4 and 5 are formed in dielectric porcelain layer 11a...11n which constitutes the top margin section 11.

[0008] For example, the thickness buffer coats 4 and 5 formed on dielectric porcelain layer 11b are formed so that it may extend in the center section from

the both-ends side of dielectric porcelain layer 11b. The thickness buffer coat 5 is formed so that it may correspond to the 2nd and margin 3E of the point of the 2nd internal electrode 3, and consists of a dielectric porcelain ingredient which other dielectric porcelain layers 11a-13n and sintering behavior approximated, and a metallic material which has conductivity so that that of the thickness buffer coat 4 may correspond to the 1st and margin 2E of the point of the 1st internal electrode 2.

[0009] Moreover, thickness buffer coat **** 4 and 5 is formed like the top margin section 11 in 12n of dielectric porcelain layers which constitute the bottom margin section 13, and 13a...13n.

[0010] And the 1st external terminal electrode 8 and the 2nd external terminal electrode 9 are arranged in the edge, i.e., an end face, the vertical side, and the both-sides side in the both-ends side of the pair of the body 1 of a capacitor which consists of the above-mentioned top margin section 11, the capacity formation section 12, and the bottom margin section 13.

[0011] The 1st external terminal electrode 8 and the 2nd external terminal electrode 9 consist of thick-film-conductor substrate film which uses Ag etc. as a principal component, and a surface deposit. And the 1st external terminal electrode 8 will be connected with the thickness buffer coat 5 and the 1st internal electrode 2 which have been arranged between dielectric porcelain layers [11a-13n] layers. Moreover, the 2nd external terminal electrode 9 will be connected with the thickness buffer coat 4 and the 2nd internal electrode 3 which have been arranged between dielectric porcelain layers [11a-13n] layers.

[0012] In the stacked type ceramic condenser of such a configuration, the 1st internal electrode 2 and the 2nd internal electrode 3 will counter through the dielectric porcelain layers 12b-12l., respectively, predetermined capacity occurs according to the thickness of the opposed face product and a dielectric porcelain layer, and a dielectric constant, and the capacity component can be derived from between the 1st external terminal electrode 8 and the 2nd external terminal electrodes 9.

[0013] Even if it carries out the pressurization laminating of the dielectric clean sheet used as each dielectric porcelain layers 11a-13n that the body 1 of a capacitor should be formed by arranging the thickness buffer coats 4 and 5 in the above-mentioned top margin section 11 and the above-mentioned bottom margin section, distribution of an electrode can make it abbreviation homogeneity into the body 1 of a capacitor, welding pressure can be equalized, there is no consistency unevenness, and the exfoliation for dielectric porcelain layer 11a-13n decreases.

[0014]

[Problem(s) to be Solved by the Invention] However, if it is going to miniaturize a stacked type ceramic condenser, the spacing x of the end margins 2E and 3E in drawing 5 will become narrow. consequently, the amount of extension of the 1st external terminal electrode 8 and the 2nd external terminal electrode 9 prolonged from the end face of the body 1 of a capacitor on the top face and inferior surface of tongue of the body 1 of a capacitor -- relative -- ****** -- **

[0015] And for example, top-face side extension section 9a of the 2nd external terminal electrode 9 formed in the another side edge of the body 1 of a capacitor exceeds the amount of extension of the thickness buffer coat 5, and the point of top-face side extension section 9a of the 2nd external terminal electrode 9 and the point of the 1st internal electrode 2 counter through the upper margin section 11.

[0016] Thus, if the 2nd external terminal electrode 9 counters the 1st internal electrode 2 of different potential from this, electrostatic capacity (SUTORE capacity is called hereafter) C will occur in the meantime, and this electrostatic capacity C will be compounded with the capacity component of the capacity formation section 12. This is the same as that of the inferior-surface-of-tongue side of the body of a capacitor.

[0017] Since SUTORE capacity changed in connection with the variation in the formation location of the 1st external terminal electrode 8 formed in the both ends of the body 1 of a capacitor, and the 2nd external terminal electrode 9, this had

the problem that variation will arise also in the whole electrostatic capacity.

[0018] Since the capacitor for high frequency is low capacity originally, the amount of capacity fluctuation by the formation variation of such an external terminal electrode poses a very big problem.

[0019] It is in offering the stacked type ceramic condenser which this invention can be thought out in view of an above-mentioned trouble, and the purpose can prevent exfoliation by equalization of the consistency of the body of a capacitor, and can reduce generating of capacity variation.

[0020]

[Means for Solving the Problem] The capacity formation section which has, on the other hand, arranged by turns the internal electrode and the another side internal electrode which extends in the center section from an another side edge with which this invention extends in the center section from an edge on the other hand between the layers of two or more rectangle-like dielectric porcelain layers, The body of a capacitor which arranges the margin section which has a thickness buffer coat between the layers of two or more rectangle-like dielectric porcelain layers of this capacity formation section up and down, and changes, It is the stacked type ceramic condenser which consists of the external terminal electrode formed in the vertical side made to extend from the end face and this end face of this body of a capacitor so that it might connect with an internal electrode. One of the thickness buffer coats of said margin section as a conductive layer So that it may connect with the external terminal electrode which is not connected with the internal electrode located in the maximum upper and lower sides of this capacity formation section and may become longer than the die length of the extension section of the capacitor vertical side of this external terminal electrode It is the stacked type ceramic condenser characterized by making it extend in the direction of a center section from the edge of the body of a capacitor.

[0021]

[Function] As mentioned above, at least one of the thickness buffer coats of different potential from the margin section of said upper and lower sides and the

approaching internal electrode among the thickness buffer coats arranged between the dielectric porcelain layers which constitute the vertical margin section is constituted from this invention by the electrical conducting material. And as compared with the die length which extended in the body of capacitor vertical side of the external terminal electrode linked to the thickness buffer coat concerned, it has extended in the direction of a center from the edge of the body of a capacitor. From this, the opposite part with the capacitor vertical side of the margin section, the approaching internal electrode, and the external terminal electrode of different potential from this internal electrode is intercepted by the conductive thickness buffer coat of this external terminal electrode and this potential. Consequently, SUTORE capacity does not occur between this opposite part. In addition, in the margin section side of this internal electrode, although a capacity component occurs between conductive thickness buffer coats, since this capacity component is specified in the configuration of the conductive thickness buffer coat arranged at margin circles, the problem of the variation in capacity is not generated.

[0022] Therefore, even if the formation variation of an external terminal electrode occurs, change of the capacity component of the whole stacked type ceramic condenser is lost, and it becomes a stacked type ceramic condenser with little capacity variation.

[0023]

[Embodiment of the Invention] Hereafter, the stacked type ceramic condenser of this invention is explained in full detail based on a drawing.

[0024] Drawing 1 is the appearance perspective view of a stacked type ceramic condenser, drawing 2 is the sectional view of the stacked type ceramic condenser of this invention, and drawing 3 is the decomposition perspective view of the body of a capacitor of the stacked type ceramic condenser of this invention. In addition, the same part as the conventional technique attaches and explains the same sign.

[0025] The 1st external terminal electrode 8 and the 2nd external terminal

electrode 9 are formed, and the stacked type ceramic condenser of this invention is constituted by the both ends of the longitudinal direction of the body 1 of a capacitor.

[0026] The body 1 of a capacitor consists of the top margin section 11, the capacity formation section 12, and the bottom margin section 13. The top margin section 11 consists of dielectric porcelain layers 11a-11n, and the thickness buffer coats 4 and 5 corresponding to the end margins 2E and 3E of the capacity formation section 12 are formed between the layer.

[0027] Moreover, the 1st internal electrode 2 and the 2nd internal electrode 3 are arranged by turns in the dielectric porcelain layers 11n and 12a which constitute the capacity formation section 12, and 12a...12n. For example, rectangle-like dielectric porcelain layers 12a and 12c ... The rectangle-like 1st internal electrode 2 is arranged upwards, and they are the rectangle-like dielectric porcelain layers 12b and 12d... The 2nd internal electrode 3 is arranged upwards.

[0028] The bottom margin section 13 consists of dielectric porcelain layers 13a-13n, and the thickness buffer coats 4 and 5 corresponding to the end margins 2E and 3E of the capacity formation section 12 are formed between the layer.

[0029] Here, as for each dielectric porcelain layer, it is desirable to use the same dielectric materials, for example, it consists of barium titanate, strontium titanate, and dielectric materials that have the perovskite crystal structure containing a lead system so that sintering behavior may become the same.

[0030] Moreover, the 1st internal electrode 2 and the 2nd internal electrode 3 consist of metallic conductor film which uses Pd, Cu, nickel, etc. as a principal component.

[0031] The same ingredient as the above-mentioned internal electrodes 2 and 3 and the dielectric materials approximated to dielectric porcelain layers [11a-13n] sintering behavior may be used for the thickness buffer coats 4 and 5.

[0032] And in the edge of such a pair of the longitudinal direction of the body 1 of a capacitor, the 1st external terminal electrode 8 and the 2nd external terminal electrode 9 are put and formed. the thick-film substrate containing the metal with

which the 1st external terminal electrode 8 and the 2nd external terminal electrode 9 use Ag and Cu as a principal component -- it consists of surface deposits, such as a conductor, nickel deposit, and a solder deposit, and is crossed and formed in the end face of the both ends of the body 1 of a capacitor, i.e., the edge, the vertical side, and the both-sides side.

[0033] In addition, the sign of the extension sections 8a and 9a is attached for the part which extended in the vertical side of the body 1 of a capacitor for convenience.

[0034] The 1st above-mentioned internal electrode 2 is the dielectric porcelain layers 12a and 12c... It extends to **** of the direction of one side of a longitudinal direction (drawing left-hand side), and, thereby, connects with the 1st external terminal electrode 8. Moreover, the 2nd internal electrode 3 is the dielectric porcelain layers 12b and 12d... It extends to **** of the direction of another side of a longitudinal direction (drawing right-hand side), and, thereby, connects with the 2nd external terminal electrode 9. Therefore, on dielectric porcelain layer 12a, 1st end margin section 2E is formed so that it may not connect with the 2nd external terminal electrode 9 too hastily at the point side of the 1st internal electrode 2, and similarly, on dielectric porcelain layer 12b, 2nd end margin section 3E is formed so that it may not connect with the 1st external terminal electrode 8 too hastily at the point side of the 2nd internal electrode 3.

[0035] Moreover, the thickness buffer coats 4 and 5 and the conductive extension thickness buffer coat 6 are formed in dielectric porcelain layer 11a-11n which constitutes the top margin section 11.

[0036] For example, the thickness buffer coat 4 prolonged in the direction of a center section from an another side edge is formed, and the conductive extension thickness buffer coat 6 which extended in the direction of a center section rather than the thickness buffer coat 4 is formed in another side **** of the longitudinal direction which is 11n of dielectric porcelain layers at another side **** of the longitudinal direction on dielectric porcelain layer 11b-11l. so that it may correspond to end margin 2E of the capacity formation section 12. This

thickness buffer coat 4 and the conductive extension thickness buffer coat 6 are connected to the 2nd external terminal electrode 9.

[0037] Moreover, on the other hand, the thickness buffer coat 5 of a dielectric porcelain layers [11b-11l.] longitudinal direction prolonged in the direction of a center section from an edge so that it may correspond to **** at end margin 3E of the capacity formation section 12 is formed.

[0038] Moreover, the thickness buffer coats 4 and 5 and the conductive extension thickness buffer coat 7 are formed in 12n of dielectric porcelain layers which constitute the bottom margin section 13, and 13a-13n.

[0039] For example, on the other hand, the thickness buffer coat 5 of the longitudinal direction on dielectric porcelain layer 13a-13n prolonged in the direction of a center section from an edge on the other hand so that it may correspond to **** at end margin 3E of the capacity formation section 12 is formed. On the other hand, the conductive extension thickness buffer coat 7 of the longitudinal direction of dielectric porcelain layer 13a which extended in the direction of a center section rather than the thickness buffer coat 5 to **** is formed. This thickness buffer coat 5 and the conductive extension thickness buffer coat 7 are connected to the 1st external terminal electrode 8.

[0040] Moreover, the thickness buffer coat 4 prolonged in the direction of a center section from an another side edge is formed in another side **** of the longitudinal direction on dielectric porcelain layer 13a-13n so that it may correspond to end margin 2E of the capacity formation section 12.

[0041] If here explains the relation of the conductive extension thickness buffer coat 6, the thickness buffer coat 4, and the 2nd external terminal electrode 9 in the another side edge of the top margin section 11, although the 2nd external terminal electrode 9 is formed in the end face of the body 1 of a capacitor, it will extend in coincidence also on the top face of the body 1 of a capacitor. The die length (die length prolonged toward a center section from an end face) of this extension section 9a is set to l, and the extension die length (die length prolonged toward a center section from an end face) of the conductive extension

thickness buffer coat 6 arranged at the top margin section 11 connected with this 2nd external terminal electrode 9 is set to L. At this time, it is important to make it become L>I.

[0042] Even if extension section 9a of the 1st internal electrode 2 and the 1st external terminal electrode 9 close to the maximum top-face side 11, i.e., the top margin section, counters geometrically through the top margin section 11 by this in the capacity formation section 12, the conductive extension thickness buffer coat 6 exists in the middle. For this reason, SUTORE capacity is not generated between extension section 9a of this 1st internal electrode 2 and the 2nd external terminal electrode 9. That is, it will be intercepted by the conductive extension thickness buffer coat 6 of the 2nd external terminal electrode 9 and this potential. In addition, a capacity component occurs in instead of [which an above-mentioned SUTORE capacity does not generate] between this 1st internal electrode 2 and the conductive extension thickness buffer coat 6. However, since this capacity component can set up beforehand the relation between the 1st internal electrode 2 and the conductive extension thickness buffer coat 6, it can determine opposite relation uniformly. Therefore, the capacity component of a stacked type ceramic condenser is not changed according to the formation condition of the external terminal electrodes 8 and 9.

[0043] Similarly, relation with extension section 8a, the internal electrode 3 which approached the bottom margin section 13 also in the bottom margin section 13, for example, the 2nd internal electrode, and the external terminal electrode 8 by the side of different potential from this 2nd internal electrode 3, i.e., 1st external terminal electrode, is also the same. Namely, even if a SUTORE capacity component tends to occur between extension section 8a of the inferior surface of tongue of the body 1 of a capacitor, the 1st external terminal electrode 8 It is arranged in the bottom merge section 13, and is intercepted by the conductive extension thickness buffer coat 7 of the 1st external terminal electrode 8 and this potential, and the SUTORE capacity generated between extension section 8a of the 2nd internal electrode 3 and the 1st external terminal electrode 8 which

caused the variation in capacitance characteristics can be prevented.

[0044] As mentioned above, in a laminating ceramic condenser, the 1st internal electrode 2 and the 2nd internal electrode 3 will counter through the dielectric porcelain layers 12b-12l. in the capacity formation section 12, and a capacity component will occur by this. Moreover, an above-mentioned minute capacity between the internal electrode 2 close to the top margin section 11, for example, the 1st internal electrode, and the conductive extension thickness buffer coat 6 arranged at the top margin section 11 occurs. Furthermore, an above-mentioned minute capacity occurs between the internal electrode 3 close to the bottom margin section 13, for example, the 2nd internal electrode, and the conductive extension thickness buffer coat 7 arranged at the bottom margin section 13.

[0045] The minute capacity component formed in the capacity component, the top margin section 11, and the bottom margin section 13 which were formed in the capacity formation section 12 by this is compounded, and it is drawn from the 1st external terminal electrode 8 and the 2nd external terminal electrode 9.

[0046] In this invention, as mentioned above, in order not to influence this capacity component of the SUTORE capacity by the covering condition of the 1st external terminal electrode 8 or the 2nd external terminal electrode 9, it becomes a stacked type ceramic condenser without the variation in capacitance characteristics.

[0047] Next, the manufacture approach of the stacked type ceramic condenser of this invention is explained. In addition, the stacked type ceramic condenser formed with the same ingredient as internal electrodes 2 and 3 explains as the thickness buffer coats 4 and 5 and conductive extension thickness buffer coats 6 and 7.

[0048] First, the dielectric green sheet used as the dielectric porcelain layers 11a-13n which can extract two or more components is created.

[0049] next, the conductor which serves as the thickness buffer coats 4 and 5 to the both ends of each component field of the dielectric green sheet which serves as the dielectric porcelain layers 11b-11l. among the dielectric green sheets

which constitute the top margin section 12 of each component -- the film is formed by printing of Pd system (Pd alloys, such as Pd simple substance or Ag-Pd) or nickel system conductivity paste. the conductor of each component field of the dielectric green sheet which similarly serves as 11n of dielectric porcelain layers which, on the other hand, serves as the thickness buffer coat 5 at the edge -- the conductor which serves as the conductive extension thickness buffer coat 6 at the another side edge in the film -- the film is formed by printing of a conductive paste, respectively.

[0050] next, dielectric porcelain layer 12 a among the dielectric green sheets which constitute the capacity component section 12 of each component and 12c -- the conductor of each component field of the dielectric green sheet used as ... which becomes edge approach with the 1st internal electrode 2 on the other hand -- the film is formed by printing of Pd system (Pd alloys, such as Pd simple substance or Ag-Pd) or nickel system conductivity paste. the conductor which similarly becomes the another side edge approach of each component field of the dielectric green sheet used as dielectric porcelain layer 12 b and 12d ... 12n with the 2nd internal electrode 3 -- the film is formed by printing of a conductive paste.

[0051] next, the conductor which serves as the thickness buffer coats 4 and 5 to the both ends of each component field of the dielectric green sheet which serves as the dielectric porcelain layers 13b-13n among the dielectric green sheets which constitute the bottom margin section 13 of each component -- the film is formed by printing of Pd system (Pd alloys, such as Pd simple substance or Ag-Pd) or nickel system conductivity paste. the conductor of each component field of the dielectric green sheet which similarly is set to dielectric porcelain layer 13a which, on the other hand, serves as the conductive extension thickness buffer coat 7 at the edge -- the conductor which serves as the thickness buffer coat 4 at the another side edge in the film -- the film is formed by printing of a conductive paste, respectively.

[0052] Then, the laminating of the above-mentioned dielectric green sheet used

as the dielectric porcelain layers 11a-13n is carried out one by one, a predetermined pressure is given, and thermocompression bonding is performed.

[0053] Then, the dielectric green sheet by which the laminating was carried out is cut out according to the configuration of each component, and is calcinated in a predetermined ambient atmosphere. By this, the body 1 of a capacitor which consists of the top margin section 11 and the capacity formation section 12 bottom margin section 13 will be formed.

[0054] next, the conductor which immersed and adhered to the metal containing the metal which includes the edge containing the end face of the longitudinal direction of the pair of the calcinated body 1 of a capacitor for Ag and Cu, the paste which uses a glass frit as a formed element, Ag, and Cu, and the resin paste containing a resinous principle -- the film be burned -- or -- heat-hardening -- a thick-film substrate -- a conductor -- the film is formed.

[0055] next, this thick-film substrate -- a conductor -- nickel plating, pewter plating, etc. carry out the surface plating stratification on the film.

[0056] In the above-mentioned stacked type ceramic condenser 10, the thickness buffer coat 5 of the upper-and-lower-sides side margin sections 11 and 13 exists in the location equivalent to the 1st and margin 2E by the side of the another side edge of the capacity formation section 12 so that he can understand from drawing 2 . Moreover, the thickness buffer coat 4 of the upper-and-lower-sides side margin sections 11 and 13 exists in the location of the capacity formation section 12 which is equivalent to the 2nd and margin 3E by the side of an edge on the other hand.

[0057] Therefore, in the process which carries out thermocompression bonding of the above-mentioned dielectric green sheet, a uniform pressure will be given to the whole body 1 of a capacitor, and the unevenness of the consistency of the body 1 of a capacitor can be prevented effectively. It is hard coming to generate exfoliation etc. in dielectric porcelain layer 11a-13n at the time of decision or baking by this.

[0058] The number of arrangement of the thickness buffer coat 4 arranged at the

another side edge of the top margin section 11 and the bottom margin section 13, and the conductive extension thickness buffer coat 6 here Substantially the number of arrangement of the thickness buffer coat 5 arranged at the edge on the other hand, and the conductive extension thickness buffer coat 7 by doubling with the 2nd and the margin 3E number of the 2nd internal electrodes 3 substantially in the 1st and the margin 2E number of the 1st internal electrodes 2 Density distribution in a laminating process can be made regularity.

[0059] Moreover, the amount L of extension of the conductive extension thickness buffer coats 6 and 7 is determined by the precision at the time of forming the 1st external terminal electrode 8 and the 2nd external terminal electrode 9 that what is necessary is just to make the amount L of extension of the conductive extension thickness buffer coats 6 and 7 longer than the amount l of extension of the 1st external terminal electrode 8 and the 2nd external terminal electrode 9. Generally, the die length (the amount l of extension) of the longitudinal approach in the external surface of the body 1 of a capacitor of the 1st external terminal electrode 8 and the 2nd external terminal electrode 9 changes with configurations of a stacked type ceramic condenser, and has the dimension specification of the specification minimum value of 0.15-0.55mm, and the specification maximum of 0.35-1.40mm. Therefore, what is necessary is just to make die-length L of the conductive extension thickness buffer coats 6 and 7 extend according to a configuration more than specification maximum.

[0060] Drawing 4 is the sectional view of other stacked type ceramic condensers of this invention.

[0061] In order to, prevent dispersion in some [of the density distribution of the body 1 of a capacitor by the point of the conductive extension thickness buffer coat 6 lengthened as compared with the thickness buffer coat 4] for example, one point of the 1st internal electrode 2 is removed, and that end margin 2E' is made to correspond to the conductive extension thickness buffer coat 6 in this example. In addition, the same is said of the conductive extension thickness buffer coat 7 side.

[0062] In addition, what is necessary is just to also make margin 2E' and 3E' correspond to the number, if two or more formation of the conductive extension thickness buffer coats 6 and 7 is carried out while making margin 2E' and 3E' correspond according to the configuration of the conductive extension thickness buffer coats 6 and 7. For example, in drawing 4 , two conductive extension thickness buffer coats 6 of one side one end of the body 1 of a capacitor are formed. In this case, the 2nd two internal electrode 3 which shortened die length prolonged in an edge side on the other hand from an another side edge is formed.
[0063] In addition, although formed between the dielectric porcelain layers of the margin sections 11 and 13 to which this invention approached the example of a gestalt of the above-mentioned operation, and the conductive extension thickness buffer coats 6 and 7 approached the capacity formation section 12 then, you may form between the dielectric porcelain layers of the outermost part of each margin sections 11 and 13.
[0064]
[Effect of the Invention] As mentioned above, according to the stacked type ceramic condenser of this invention, SUTORE capacity does not occur between the external terminal electrodes and internal electrodes which extend in the up-and-down margin section in the vertical side of the body of a capacitor. It becomes the laminating ceramic condenser it did not change the capacitance characteristics of a stacked type ceramic condenser by the formation variation of an external terminal electrode, and were very stable in property with this.
[0065] Moreover, since the thickness buffer coat is arranged at the vertical margin section corresponding to the end margin formed at the tip of an internal electrode, when it pressurizes at a laminating process, the pressure of homogeneity is impressed to the whole body of a capacitor, and dispersion in a consistency can be suppressed effectively. For this reason, exfoliation between dielectric porcelain layers is suppressed at a cutting process or a baking process.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the appearance perspective view of a stacked type ceramic condenser.
[Drawing 2] It is the sectional view of the stacked type ceramic condenser of this invention.
[Drawing 3] It is the decomposition perspective view of the body of a capacitor of the stacked type ceramic condenser of this invention.
[Drawing 4] It is the sectional view of other stacked type ceramic condensers of this invention.
[Drawing 5] It is the sectional view of the conventional stacked type ceramic condenser.
[Drawing 6] It is the decomposition perspective view of the body of a capacitor of the conventional stacked type ceramic condenser.
[Description of Notations]
10 -- Stacked Type Ceramic Condenser
1 -- Body of Capacitor
11 -- Top Margin Section
12 -- Capacity Formation Section
13 -- Bottom Margin Section

2 -- 1st Internal Electrode

3 -- 2nd Internal Electrode

4 5 -- Thickness buffer coat

6 7 -- Conductive extension thickness buffer coat

2E and 3E-- and a margin

[Translation done.]

* NOTICES *

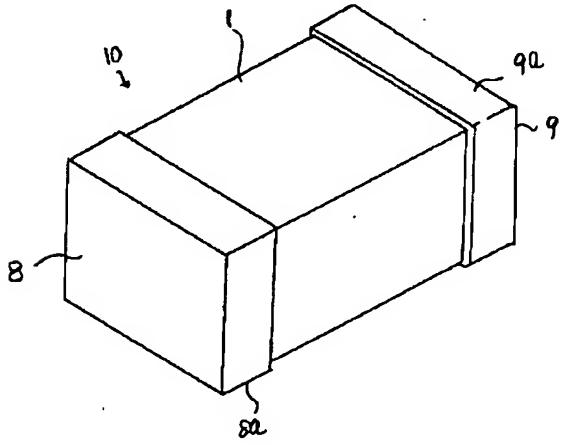
1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

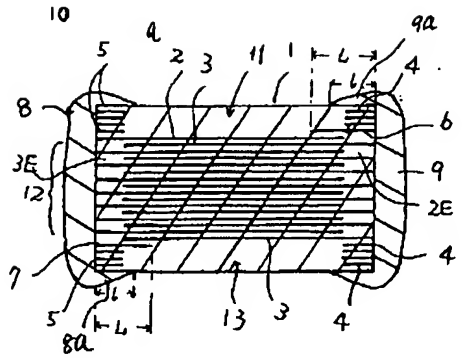
3.In the drawings, any words are not translated.

DRAWINGS

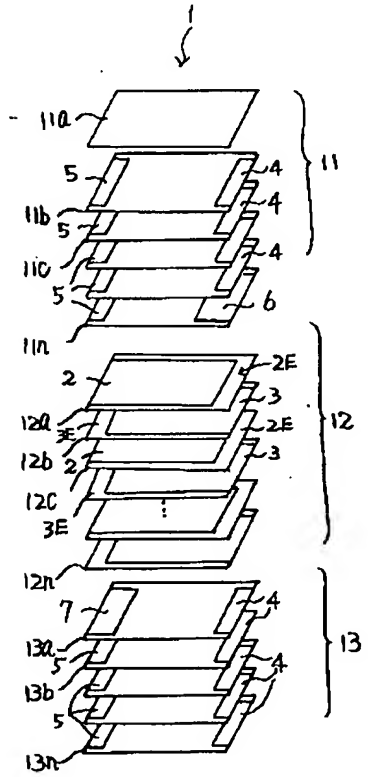
[Drawing 1]



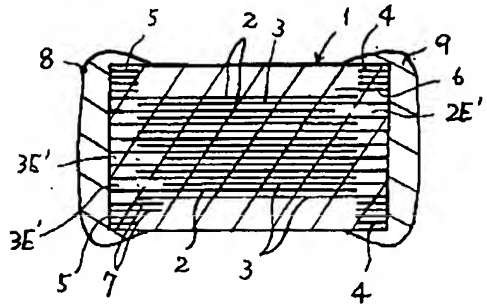
[Drawing 2]



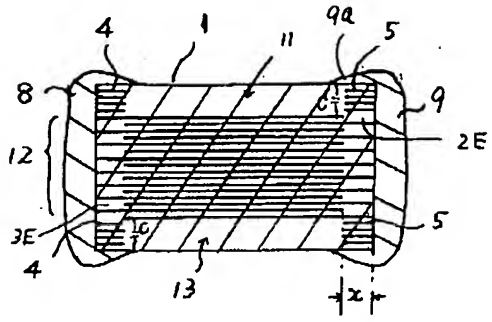
[Drawing 3]



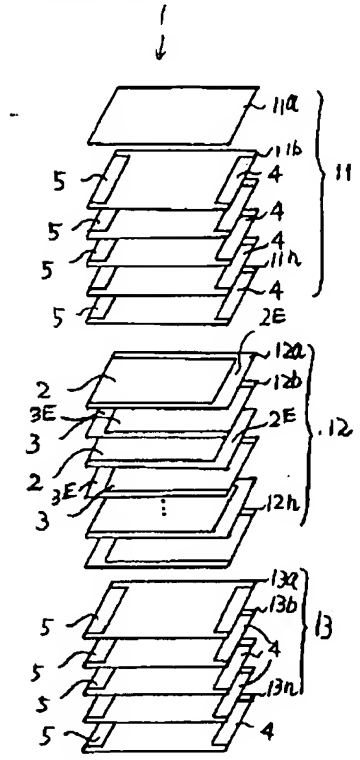
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（A）　(11)特許出願公開番号

特開平11－312623

(43)公開日　平成11年(1999)11月９日

(51)Int.Cl.[6]		識別記号	F I		
H01G	4/30	301	H01G	4/30	301C
	4/12	352		4/12	352

審査請求　未請求　請求項の数1　ＯＬ　（全７頁）

(21)出願番号　特願平10－118235

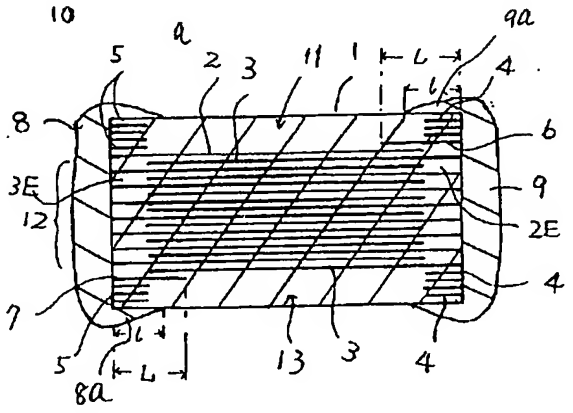
(22)出願日　平成10年(1998)４月28日

(71)出願人　000006633
京セラ株式会社
京都府京都市伏見区竹田烏羽殿町６番地

(72)発明者　内　一隆
鹿児島県国分市山下町１番１号　京セラ株式会社鹿児島国分工場内

(54)【発明の名称】　積層セラミックコンデンサ

(57)【要約】
【課題】　本発明は、コンデンサ全体としての容量のバラツキを低減し、誘電体磁器層の剥離を防止する。
【解決手段】　上側マージン部１１と、容量形成部１２と、下側マージン部１３とから成るコンデンサ本体１の一方の端部に、容量形成部１２の第１内部電極２に接続する外部端子電極８を、他方の端部に容量形成部１２の第２内部電極３に接続する外部端子電極９を夫々形成して成る積層セラミックコンデンサ１である。そして、前記上下側マージン部１１、１３には第１及び第２外部端子電極８、９が形成された端部から中央部に延びる厚み緩衝層４、５を配置し、さらに、厚み緩衝層４、５の少なくとも１つを、当該厚み緩衝層と接続する外部端子電極８、９のコンデンサ本体１外表面の延在長に比較してコンデンサ本体１の中央部側に延在した導電性延出厚み緩衝層６、７とした。



1

【特許請求の範囲】

【請求項１】　複数の矩形状誘電体磁器層の層間に一方端部から中央部に延出する一方内部電極、他方端部から中央部に延出する他方内部電極を交互に配置した容量形成部と、該容量形成部の上下に複数の矩形状誘電体磁器層の層間に、厚み緩衝層を有するマージン部を配置して成るコンデンサ本体と、

該コンデンサ本体の端面及び該端面から延在させた上下面に、内部電極と接続するように形成した外部端子電極とから成る積層セラミックコンデンサであって、

前記マージン部の厚み緩衝層の１つは、導電層として、該容量形成部の最上下に位置した内部電極と接続されていない外部端子電極に接続し、且つ該外部端子電極のコンデンサ上下面の延在部の長さよりも長くなるように、コンデンサ本体の端部から中央部方向に延出させたことを特徴とする積層セラミックコンデンサ。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は積層セラミックコンデンサに関するものである。

【０００２】

【従来の技術】従来、積層された複数の矩形状誘電体磁器層間に第１内部電極と第２内部電極とを交互に配置して成る容量形成部と、該容量形成部の両主面側に配置した複数の矩形状誘電体磁器層からなるマージン部とから成るコンデンサ本体の一方端部に、前記第１内部電極と接続する第１外部端子電極を、他方端部に、前記第２内部電極と接続する第２外部端子電極を形成した積層セラミックコンデンサが知られており、そして、マージン部を構成する誘電体磁器層間には、前記外部端子電極が形成された端部から中央部に延びる厚み緩衝層を配置した積層セラミックコンデンサが提案されていた（特開平５－２３４８０５号）。

【０００３】図１は、一般的な積層セラミックコンデンサの外観斜視図であり、図５は、積層セラミックコンデンサの断面図である。図６は、積層セラミックコンデンサのコンデンサ本体の分解斜視図である。

【０００４】積層セラミックコンデンサは、複数の誘電体磁器層及び内部電極などを積層したコンデンサ本体１の両端面を含む端部に、第１外部端子電極８、第外部端子電極９が形成されていた。

【０００５】このコンデンサ本体１は、上側マージン部１１、容量形成部１２、下側マージン部１３とから構成されており、容量形成部１２を構成する誘電体磁器層１１ｎ、１２ａ、１２ａ・・・１２ｎ間に第１内部電極２及び第２内部電極３が交互に配置されている。例えば、矩形状誘電体磁器層１２ａ、１２ｃ・・・上に矩形状の第１内部電極２が配置され、矩形状誘電体磁器層１２ｂ、１２ｄ・・・上に第２内部電極３が配置されている。

2

【０００６】ここで、第１内部電極２は、誘電体磁器層１２ａの長手方向の一方の端辺（図では左側）に延出しており、第２内部電極３は、誘電体磁器層１２ｂの長手方向の他方（図では右側）の端辺に延出している。そして、誘電体磁器層１２ａ上には、第１内部電極２の先端部側（他方端部側）に余白部（第１のエンドマージン部２Ｅ）が形成されている。同様に、誘電体磁器層１２ｂ上には、第２内部電極３の先端部側（一方端部側）に余白部（第２のエンドマージン部３Ｅ）が形成されている。

【０００７】また、上側マージン部１１を構成する誘電体磁器層１１ａ・・・１１ｎ間に厚み緩衝層４、５が形成されている。

【０００８】例えば、誘電体磁器層１１ｂ上に形成された厚み緩衝層４、５は、誘電体磁器層１１ｂの両端部側から中央部に延びるように形成されている。厚み緩衝層４のは、第１内部電極２の先端部の第１エンドマージン２Ｅに対応するように、また、厚み緩衝層５は、第２内部電極３の先端部の第２エンドマージン３Ｅに対応するように形成されており、他の誘電体磁器層１１ａ～１３ｎと焼結挙動が近似した誘電体磁器材料、導電性を有する金属材料から構成されている。

【０００９】また、下側マージン部１３を構成する誘電体磁器層１２ｎ、１３ａ・・・１３ｎ間に、上側マージン部１１と同様に厚み緩衝層器層４、５が形成されている。

【００１０】そして、上述の上側マージン部１１、容量形成部１２、下側マージン部１３から成るコンデンサ本体１の一対の両端面を端部、即ち、端面、上下面及び両側面には、第１外部端子電極８、第２外部端子電極９が配置されている。

【００１１】第１外部端子電極８、第２外部端子電極９はＡｇなどを主成分とする厚膜導体下地膜と表面のメッキ層とから構成されている。そして、第１外部端子電極８は、誘電体磁器層１１ａ～１３ｎの層間に配置された厚み緩衝層５、第１内部電極２と接続することになる。また、第２外部端子電極９は、誘電体磁器層１１ａ～１３ｎの層間に配置された厚み緩衝層４、第２内部電極３と接続することになる。

【００１２】このような構成の積層セラミックコンデンサにおいては、第１内部電極２と第２内部電極３とが夫々誘電体磁器層１２ｂ～１２１を介して対向することになり、その対向面積、誘電体磁器層の厚み、誘電率に応じて、所定容量が発生し、第１外部端子電極８と第２外部端子電極９との間からその容量成分を導出することができる。

【００１３】上述の上側マージン部１１及び下側マージン部に厚み緩衝層４、５を配置することにより、コンデンサ本体１を形成すべく、各誘電体磁器層１１ａ～１３ｎとなる誘電体クリーンシートを加圧積層しても、コン

デンサ本体１内に電極の分布が略均一にすることができ、加圧力を均一化でき、密度むらがなく、誘電体磁器層１１ａ～１３ｎ間の剥離が減少する。

【００１４】

【発明が解決しようとする課題】しかし、積層セラミックコンデンサを小型化しようとすると、図５におけるエンドマージン２Ｅ、３Ｅの間隔ｘが狭くなる。その結果、コンデンサ本体１の端面からコンデンサ本体１の上面及び下面に延びる第１外部端子電極８、第２外部端子電極９の延出量は、相対的にながくなる。

【００１５】そして、例えば、コンデンサ本体１の他方端部に形成した第２外部端子電極９の上面側延出部９ａが、厚み緩衝層５の延出量を越えてしまい、上マージン部１１を介して、第２外部端子電極９の上面側延出部９ａの先端部と第１内部電極２の先端部とが対向する。

【００１６】このように、第２外部端子電極９が、これと異なる電位の第１内部電極２に対向すると、その間に静電容量（以下、ストレー容量と称する）Ｃが発生し、この静電容量Ｃが容量形成部１２の容量成分と合成されてしまう。これは、コンデンサ本体の下面側においても同様である。

【００１７】これは、コンデンサ本体１の両端部に形成した第１外部端子電極８、第２外部端子電極９の形成位置のバラツキに伴って、ストレー容量が変化するため、全体の静電容量にもバラツキが生じてしまうという問題があった。

【００１８】高周波用コンデンサは元来、低容量であるため、このような外部端子電極の形成バラツキによる容量変動量は非常に大きな問題となる。

【００１９】本発明は上述の問題点に鑑みて案出されたものであり、その目的は、コンデンサ本体の密度の均一化による剥離が防止でき、且つ容量バラツキの発生を低減できる積層セラミックコンデンサを提供することにある。

【００２０】

【課題を解決するための手段】本発明は、複数の矩形状誘電体磁器層の層間に一方端部から中央部に延出する一方内部電極、他方端部から中央部に延出する他方内部電極を交互に配置した容量形成部と、該容量形成部の上下に複数の矩形状誘電体磁器層の層間に、厚み緩衝層を有するマージン部を配置して成るコンデンサ本体と、該コンデンサ本体の端面及び該端面から延在させた上下面に、内部電極と接続するように形成した外部端子電極とから成る積層セラミックコンデンサであって、前記マージン部の厚み緩衝層の１つは、導電層として、該容量形成部の最上下に位置した内部電極と接続されていない外部端子電極に接続し、且つ該外部端子電極のコンデンサ上下面の延在部の長さよりも長くなるように、コンデンサ本体の端部から中央部方向に延出させたことを特徴とする積層セラミックコンデンサである。

【００２１】

【作用】以上のように、本発明では、上下マージン部を構成する誘電体磁器層間に配置された厚み緩衝層の内、前記上下のマージン部と近接する内部電極と異なる電位の厚み緩衝層の少なくとも１つは、導電材料で構成されている。そして、当該厚み緩衝層と接続する外部端子電極のコンデンサ本体上下面に延在した長さに比較してコンデンサ本体の端部から中央方向に延在している。これより、マージン部と近接する内部電極と、この内部電極と異なる電位の外部端子電極のコンデンサ上下面との対向部分は、該外部端子電極と同電位の導電性厚み緩衝層によって遮断される。その結果、この対向部分との間には、ストレー容量が発生しない。尚、この内部電極のマージン部側には、導電性厚み緩衝層との間に容量成分が発生するものの、この容量成分は、マージン部内に配置された導電性厚み緩衝層の形状に規定されるものであるから、容量のバラツキという問題は発生しない。

【００２２】従って、外部端子電極の形成バラツキが発生しても、積層セラミックコンデンサの全体の容量成分の変化がなくなり、容量バラツキの少ない積層セラミックコンデンサとなる。

【００２３】

【発明の実施の形態】以下、本発明の積層セラミックコンデンサを図面に基づいて詳説する。

【００２４】図１は、積層セラミックコンデンサの外観斜視図であり、図２は本発明の積層セラミックコンデンサの断面図であり、図３は本発明の積層セラミックコンデンサのコンデンサ本体の分解斜視図である。尚、従来技術と同一部分は同一符号を付して説明する。

【００２５】本発明の積層セラミックコンデンサは、コンデンサ本体１の長手方向の両端部に第１外部端子電極８、第２外部端子電極９が形成されて構成されている。

【００２６】コンデンサ本体１は、上側マージン部１１、容量形成部１２、下側マージン部１３から構成されている。上側マージン部１１は、誘電体磁器層１１ａ～１１ｎから構成されており、その層間には、容量形成部１２のエンドマージン２Ｅ、３Ｅに対応した、厚み緩衝層４、５が形成されている。

【００２７】また、容量形成部１２を構成する誘電体磁器層１１ｎ、１２ａ、１２ａ・・・１２ｎ間に第１内部電極２及び第２内部電極３が交互に配置されている。例えば、矩形状誘電体磁器層１２ａ、１２ｃ・・・上に矩形状の第１内部電極２が配置され、矩形状誘電体磁器層１２ｂ、１２ｄ・・・上に第２内部電極３が配置されている。

【００２８】下側マージン部１３は、誘電体磁器層１３ａ～１３ｎから構成されており、その層間には、容量形成部１２のエンドマージン２Ｅ、３Ｅに対応した、厚み緩衝層４、５が形成されている。

【００２９】ここで、各誘電体磁器層は、焼結挙動が同

—になるように、同一誘電体材料を用いることが望ましく、例えば、チタン酸バリウム、チタン酸ストロンチウム、鉛系を含有するペロブスカイト結晶構造を有する誘電体材料から構成されている。

【００３０】また、第１内部電極２、第２内部電極３は、例えば、Ｐｄ、Ｃｕ、Ｎｉなどを主成分とする金属導体膜とから構成されている。

【００３１】厚み緩衝層４、５は、上述の内部電極２、３と同一材料や、誘電体磁器層１１ａ～１３ｎの焼結挙動に近似した誘電体材料を用いても構わない。

【００３２】そして、このようなコンデンサ本体１の長手方向の一対の端部には、第１外部端子電極８、第２外部端子電極９が被着・形成されている。第１外部端子電極８、第２外部端子電極９は、ＡｇやＣｕを主成分とする金属を含む厚膜下地導体、Ｎｉメッキ層や半田メッキ層などの表面メッキ層から構成され、コンデンサ本体１の両端部、即ち、その端部の端面、上下面、両側面に渡って形成されている。

【００３３】尚、便宜上、コンデンサ本体１の上下面に延在した部分を延在部８ａ、９ａの符号を付す。

【００３４】上述の第１内部電極２は、誘電体磁器層１２ａ、１２ｃ・・・の長手方向の一方方向（図では左側）の端辺に延出し、これにより、第１外部端子電極８に接続されている。また、第２内部電極３は、誘電体磁器層１２ｂ、１２ｄ・・・の長手方向の他方方向（図では右側）の端辺に延出し、これにより、第２外部端子電極９に接続されている。従って、誘電体磁器層１２ａ上には、第１内部電極２の先端部側に、第２外部端子電極９に短絡しないように第１のエンドマージン部２Ｅが形成され、同様に、誘電体磁器層１２ｂ上には、第２内部電極３の先端部側に、第１外部端子電極８に短絡しないように第２のエンドマージン部３Ｅが形成されている。

【００３５】また、上側マージン部１１を構成する誘電体磁器層１１ａ～１１ｎ間に厚み緩衝層４、５、導電性延出厚み緩衝層６が形成されている。

【００３６】例えば、誘電体磁器層１１ｂ～１１１上の長手方向の他方端辺には、容量形成部１２のエンドマージン２Ｅに対応するように、他方端部から中央部方向に延びる厚み緩衝層４が形成され、誘電体磁器層１１ｎの長手方向の他方端辺には、厚み緩衝層４よりも中央部方向に延出した導電性延出厚み緩衝層６が形成されている。この厚み緩衝層４及び導電性延出厚み緩衝層６は、第２外部端子電極９に接続される。

【００３７】また、誘電体磁器層１１ｂ～１１１の長手方向の一方端辺には、容量形成部１２のエンドマージン３Ｅに対応するように端部から中央部方向に延びる厚み緩衝層５が形成されている。

【００３８】また、下側マージン部１３を構成する誘電体磁器層１２ｎ、１３ａ～１３ｎ間に厚み緩衝層４、５、導電性延出厚み緩衝層７が形成されている。

【００３９】例えば、誘電体磁器層１３ａ～１３ｎ上の長手方向の一方端辺には、容量形成部１２のエンドマージン３Ｅに対応するように、一方端部から中央部方向に延びる厚み緩衝層５が形成されている。誘電体磁器層１３ａの長手方向の一方端辺には、厚み緩衝層５よりも中央部方向に延出した導電性延出厚み緩衝層７が形成されている。この厚み緩衝層５及び導電性延出厚み緩衝層７は、第１外部端子電極８に接続される。

【００４０】また、誘電体磁器層１３ａ～１３ｎ上の長手方向の他方端辺には、容量形成部１２のエンドマージン２Ｅに対応するように、他方端部から中央部方向に延びる厚み緩衝層４が形成されている。

【００４１】ここで上側マージン部１１の他方端部における導電性延出厚み緩衝層６、厚み緩衝層４と第２外部端子電極９との関係を説明すると、第２外部端子電極９は、コンデンサ本体１の端面に形成されるものの、同時にコンデンサ本体１の上面にも延在する。この延在部９ａの長さ（端面から中央部に向かって延びる長さ）をｌとし、この第２外部端子電極９と接続された上側マージン部１１に配置された導電性延出厚み緩衝層６の延出長さ（端面から中央部に向かって延びる長さ）をＬとする。この時、Ｌ＞ｌとなるようにすることが重要である。

【００４２】これにより、容量形成部１２で最上面側に、即ち、上側マージン部１１に近接した第１内部電極２と第１外部端子電極９の延在部９ａとが、上側マージン部１１を介して形状的に対向しても、その途中に導電性延出厚み緩衝層６が存在する。このため、この第１内部電極２と第２外部端子電極９の延在部９ａとの間では、ストレー容量は発生しない。即ち、第２外部端子電極９と同電位の導電性延出厚み緩衝層６によって遮断されることになる。尚、上述のストレー容量が発生しない代わりに、この第１内部電極２と導電性延出厚み緩衝層６との間に容量成分が発生する。しかし、この容量成分は、第１内部電極２と導電性延出厚み緩衝層６との関係を予め設定できるため、対向関係を画一的に決定できる。従って、積層セラミックコンデンサの容量成分は、外部端子電極８、９の形成状態によって変動することがない。

【００４３】同様に、下側マージン部１３においても、下側マージン部１３に近接した内部電極、例えば第２内部電極３と、この第２内部電極３と異なる電位側の外部端子電極、即ち、第１外部端子電極８の延在部８ａとの関係も同じである。即ち、第１外部端子電極８がコンデンサ本体１の下面の延在部８ａとの間でストレー容量成分が発生しようとしても、下側マージ部１３内に配置され、第１外部端子電極８と同電位の導電性延出厚み緩衝層７によって遮断され、容量特性のバラツキの原因である第２内部電極３と第１外部端子電極８の延在部８ａとの間に発生するストレー容量を防止できる。

【００４４】上述のように積層セラミックコンデンサでは、容量形成部１２で第１内部電極２と第２内部電極３とが誘電体磁器層１２ｂ～１２１とを介して対向し、これにより容量成分が発生することになる。また、上側マージン部１１に近接した内部電極、例えば第１内部電極２と上側マージン部１１に配置された導電性延出厚み緩衝層６との間の上述の微小の容量が発生する。さらに、下側マージン部１３に近接した内部電極、例えば第２内部電極３と下側マージン部１３に配置された導電性延出厚み緩衝層７との間で上述の微小の容量が発生する。

【００４５】これにより、容量形成部１２で形成された容量成分と上側マージン部１１及び下側マージン部１３に形成された微小容量成分とが合成され、第１外部端子電極８と第２外部端子電極９とから導出される。

【００４６】本発明では、この容量成分が、上述したように、第１外部端子電極８や第２外部端子電極９の被着状態によるストレー容量の影響を受けることがないため、容量特性のバラツキがない積層セラミックコンデンサとなる。

【００４７】次に、本発明の積層セラミックコンデンサの製造方法を説明する。尚、厚み緩衝層４、５及び導電性延出厚み緩衝層６、７として、内部電極２、３と同一材料で形成した積層セラミックコンデンサで説明する。

【００４８】まず、複数の素子が抽出できる誘電体磁器層１１ａ～１３ｎとなる誘電体グリーンシートを作成する。

【００４９】次に、各素子の上側マージン部１２を構成する誘電体グリーンシートのうち、誘電体磁器層１１ｂ～１１１となる誘電体グリーンシートの各素子領域の両端部に、厚み緩衝層４、５となる導体膜をＰｄ系（Ｐｄ単体またはＡｇ－ＰｄなどのＰｄ合金）またはＮｉ系導電性ペーストの印刷により形成する。同様に、誘電体磁器層１１ｎとなる誘電体グリーンシートの各素子領域の一方端部に厚み緩衝層５となる導体膜を、他方端部に導電性延出厚み緩衝層６となる導体膜を夫々導電性ペーストの印刷により形成する。

【００５０】次に、各素子の容量成分部１２を構成する誘電体グリーンシートのうち、誘電体磁器層１２ａ、１２ｃ・・・となる誘電体グリーンシートの各素子領域の一方端部寄りに、第１内部電極２となる導体膜をＰｄ系（Ｐｄ単体またはＡｇ－ＰｄなどのＰｄ合金）またはＮｉ系導電性ペーストの印刷により形成する。同様に、誘電体磁器層１２ｂ、１２ｄ・・・１２ｎとなる誘電体グリーンシートの各素子領域の他方端部寄りに、第２内部電極３となる導体膜を導電性ペーストの印刷により形成する。

【００５１】次に、各素子の下側マージン部１３を構成する誘電体グリーンシートのうち、誘電体磁器層１３ｂ～１３ｎとなる誘電体グリーンシートの各素子領域の両端部に、厚み緩衝層４、５となる導体膜をＰｄ系（Ｐｄ単体またはＡｇ－ＰｄなどのＰｄ合金）またはＮｉ系導電性ペーストの印刷により形成する。同様に、誘電体磁器層１３ａとなる誘電体グリーンシートの各素子領域の一方端部に導電性延出厚み緩衝層７となる導体膜を、他方端部に厚み緩衝層４となる導体膜を夫々導電性ペーストの印刷により形成する。

【００５２】その後、誘電体磁器層１１ａ～１３ｎとなる上述の誘電体グリーンシートを順次積層し、所定圧力を与えて熱圧着を行う。

【００５３】その後、積層された誘電体グリーンシートを、各素子の形状に応じて裁断し、所定雰囲気で焼成する。これにより、上側マージン部１１、容量形成部１２下側マージン部１３とから成るコンデンサ本体１が形成されることになる。

【００５４】次に、焼成されたコンデンサ本体１の一対の長手方向の端面を含む端部を、Ａｇ、Ｃｕを含む金属、ガラスフリットを固形成分とするペーストやＡｇ、Ｃｕを含む金属、樹脂成分を含む樹脂ペーストに浸漬し、付着した導体膜を焼き付けまたは熱硬化して、厚膜下地導体膜を形成する。

【００５５】次に、この厚膜下地導体膜上に、Ｎｉメッキやハンダメッキなどの表面メッキ層形成する。

【００５６】上述の積層セラミックコンデンサ１０において、図２から理解できるように、容量形成部１２の他方端部側の第１エンドマージン２Ｅに相当する位置には、上下側マージン部１１、１３の厚み緩衝層５が存在する。また、容量形成部１２の一方端部側の第２エンドマージン３Ｅに相当する位置には、上下側マージン部１１、１３の厚み緩衝層４が存在する。

【００５７】従って、上述の誘電体グリーンシートを熱圧着する工程において、コンデンサ本体１の全体に均一な圧力が与えられることになり、コンデンサ本体１の密度のむらを有効に防止できる。これによって、裁断時または焼成時において、誘電体磁器層１１ａ～１３ｎ間で剥離などが発生しにくくなる。

【００５８】ここで、上側マージン部１１、下側マージン部１３の他方端部に配置された厚み緩衝層４及び導電性延出厚み緩衝層６の配置数を、実質的に第１内部電極２の第１エンドマージン２Ｅ数に、一方端部に配置された厚み緩衝層５及び導電性延出厚み緩衝層７の配置数を、実質的に第２内部電極３の第２エンドマージン３Ｅ数に合わせることにより、積層工程における密度分布を一定にすることができる。

【００５９】また、導電性延出厚み緩衝層６、７の延出量Ｌは、第１外部端子電極８及び第２外部端子電極９の延出量ｌよりも長くすればよく、第１外部端子電極８及び第２外部端子電極９を形成する際の精度によって、導電性延出厚み緩衝層６、７の延出量Ｌが決定される。一般に、第１外部端子電極８及び第２外部端子電極９のコンデンサ本体１の外面における長手方法の長さ（延出量

１）は、積層セラミックコンデンサの形状によって異なり、規格最小値０．１５～０．５５ｍｍ、規格最大値０．３５～１．４０ｍｍという寸法規格を有する。従って、導電性延出厚み緩衝層６、７の長さＬは、形状に応じて、規格最大値以上に延出させればよい。

【００６０】図４は、本発明の他の積層セラミックコンデンサの断面図である。

【００６１】この実施例では、例えば、厚み緩衝層４に比較して長くした導電性延出厚み緩衝層６の先端部によるコンデンサ本体１の密度分布の若干のばらつきを防止するため、第１内部電極２の１つの先端部を除去して、そのエンドマージン２Ｅ’を導電性延出厚み緩衝層６に対応させている。尚、導電性延出厚み緩衝層７側についても同様である。

【００６２】尚、導電性延出厚み緩衝層６、７の形状に合わせて、エンドマージン２Ｅ’、３Ｅ’を対応させるとともに、導電性延出厚み緩衝層６、７を複数形成すれば、エンドマージン２Ｅ’、３Ｅ’もその数に対応させればよい。例えば、図４においては、コンデンサ本体１の一方端側の導電性延出厚み緩衝層６を２つ形成している。この場合、他方端部から一方端部側に延びる長さを短くした第２内部電極３を２つ設けている。

【００６３】なお、本発明は上記の実施の形態例にでは、導電性延出厚み緩衝層６、７は、容量形成部１２に近接したマージン部１１、１３の誘電体磁器層間に形成されているが、各マージン部１１、１３の最も外側の誘電体磁器層間に形成しても構わない。

【００６４】

【発明の効果】以上、本発明の積層セラミックコンデンサによれば、上下のマージン部に、コンデンサ本体の上下面に延在する外部端子電極と内部電極との間にストレー容量が発生することがない。これによって、積層セラミックコンデンサの容量特性が、外部端子電極の形成バ＊ラツキによって変動することがなく、特性的に非常に安定した積層セラミックコンデンサとなる。

【００６５】また、内部電極の先端に形成されるエンドマージンに対応して、上下マージン部に厚み緩衝層が配置されているため、積層工程で加圧した場合、コンデンサ本体全体に均一の圧力が印加されて、密度のばらつきを有効に抑えられる。このため、切断工程や焼成工程で誘電体磁器層間の剥離が抑えられる。

【図面の簡単な説明】

【図１】積層セラミックコンデンサの外観斜視図である。

【図２】本発明の積層セラミックコンデンサの断面図である。

【図３】本発明の積層セラミックコンデンサのコンデンサ本体の分解斜視図である。

【図４】本発明の他の積層セラミックコンデンサの断面図である。

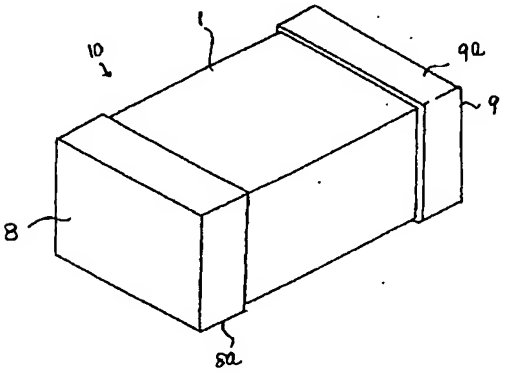
【図５】従来の積層セラミックコンデンサの断面図である。

【図６】従来の積層セラミックコンデンサのコンデンサ本体の分解斜視図である。

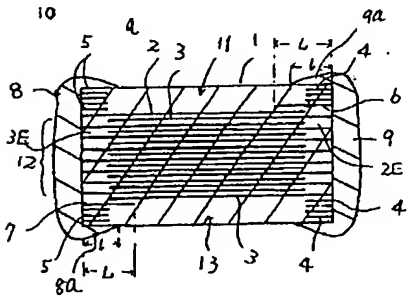
【符号の説明】

１０　…積層セラミックコンデンサ
１　…コンデンサ本体
１１　…上側マージン部
１２　…容量形成部
１３　…下側マージン部
２　…第１内部電極
３　…第２内部電極
４、５…厚み緩衝層
６、７…導電性延出厚み緩衝層
２Ｅ，３Ｅ…エンドマージン

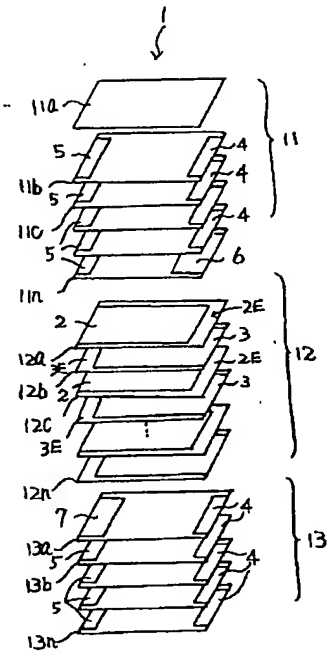
【図１】



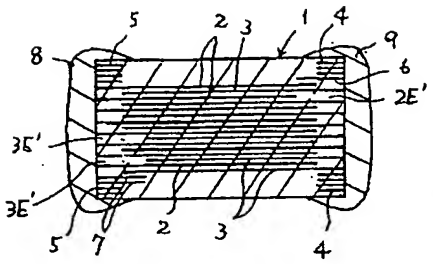
【図２】



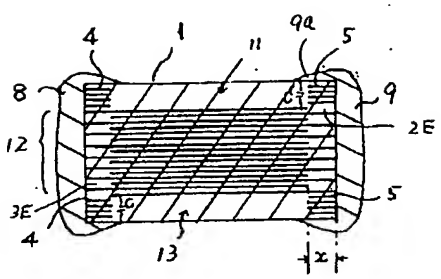
【図３】


1
11a
11b
11c
11n
5
4
6
11
2
3
2E
12a
12b
12c
12n
3E
7
13a
13b
13n
12
13

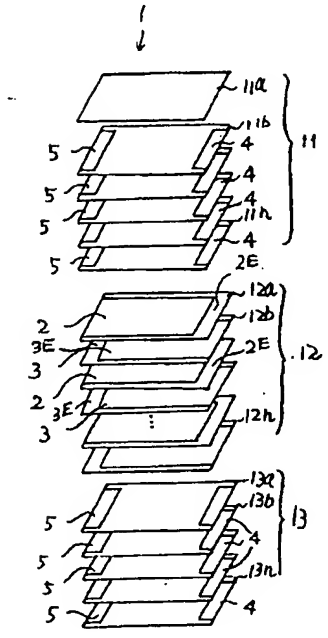
【図４】


8
5
2
3
1
4
9
6
2E'
3E'
7

【図５】


4
1
11
9a
5
8
9
12
2E
3E
5
13
x

【図６】


1
11a
11b
11n
5
4
11
2
3E
3
12a
12b
12n
2E
12
13a
13b
13n
13